

Name_____

Date_____

Midterm Study Guide CP Living Y2

Use your notes to answer the following questions

Define Chemistry

Since chemistry studies matter what is the definition of matter.

What is a physical property of matter? Give some examples.

Define Extensive and Intensive properties.

Classify the following as either a Extensive (E) or an Intensive property (I).

_____ Texture

_____ Length

_____ Mass

_____ Density

_____ Volume

_____ Boiling Point

_____ Luster (Shininess)

_____ Melting Point

_____ Specific Heat

What are mixtures?

What is a pure substance?

Distinguish between elements and compounds?

What are the four symbols we use to designate the phase of substances?

If a salt is aqueous, how could it be recovered?

What are physical and chemical changes?

Classify the following as either a chemical change/property (C) or a physical change/property (P).

_____ Burning Paper

_____ Water melting

_____ Digesting Food

_____ Painting a wall

_____ Water Evaporating

_____ Cutting Wire

_____ A metal shining

_____ Measuring water in a cylinder

_____ Crushing Rock

What are the four things that indicate a chemical change?

What are the properties of metal, nonmetals and metalloids?

What are the rows on the periodic table called? What are the columns called? How are elements sorted into rows and columns?

Who was the first person to develop the Periodic table and how did he arrange the elements on the periodic table?

Define Periodicity

Explain why there were some question marks in the place of elements on the early periodic table?

The density of Ca is 1.55 g/cm^3 and the density of Ba is 3.51 g/cm^3 , estimate the density of Sr. What is your percent error, when the actual density is 2.66 g/cm^3 ?

List the properties AND location on the periodic table of the following types of elements

Alkali Metals

Transition Metals

Noble Gases

Alkaline Earth Metals

Halogens

What are all the metric units that we have talked about thus far? Draw a chart that will help you remember them.

How would you convert between two units. Try the following (show all work)

$$25 \text{ cm} = \underline{\hspace{2cm}} \text{ km}$$

$$50 \text{ g} = \underline{\hspace{2cm}} \text{ dg}$$

$$900 \text{ hm} = \underline{\hspace{2cm}} \text{ km}$$

$$677 \text{ L} = \underline{\hspace{2cm}} \text{ cL}$$

$$478 \text{ g} = \underline{\hspace{2cm}} \text{ mg}$$

$$90 \text{ dm} = \underline{\hspace{2cm}} \text{ hm}$$

What units of measurement would you use to measure the following? Pick the best prefix for each measurement as well

Thickness of a staple _____
house _____

Distance from school to your

Volume a soda can hold _____

Mass of a car _____

Define Accuracy and Precision.

Explain whether the following series of numbers are accurate, precise, or both.

Student's mass of object: 78.1 g 78.2 g 78.1 g 78.0 g

Actual mass of object; 70.0 g

What is the formula for percent error? If the volume of an object is actually 520 mL and its volume is measured to be 500 mL, what is the percent error?

A student records the following masses of various samples of aluminum:

Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
6.44 mL	6.30 mL	6.70 mL	6.80 mL	6.55 mL

The average recorded mass is (SHOW WORK WITH UNITS):

The precision of the measurement is: (Note express this using + or – notation)

For the following calculations:

- the volume of a cylinder is $\pi r^2 h$
- the volume of a cube is $L \times W \times H$.

The mass of stone was found to be 127.0 g. The initial water level in a graduated cylinder was found to be 5.00 mL, and when the stone was placed inside it rose to 53.0 mL. What is the density of the stone?

A cylinder has diameter of 1.2 cm and a height of 7.0 cm. What is the density of the cylinder if it has a mass of 65.0 g?

A block of copper ($D = 8.94 \text{ g/mL}$) has a mass of 1500 g. If two of its dimensions are 15cm and 8cm, what is the third dimension?

Who was the Greek philosopher who coined the term ‘atom’?

What are the five points of Dalton's atomic theory?

Which points of Dalton's atomic theory are incorrect by today's standards? **Explain why.**

Explain who used the cathode ray tube and what they found using it? How did he model the atom?

What was done in Rutherford's gold foil experiment? Explain with a picture.

What were Rutherford's conclusions about the atom and its structure?

What are the three parts of the atom? Where in the atom are they found? What are the charges and masses of each?

Define the term isotope.

The chlorine isotopes are listed below, what is the average atomic mass of chlorine?

Isotope	Atomic Mass (amu)	% Abundance
Chlorine-35	34.97	75.53
Chlorine-37	36.97	24.47

What makes an isotope stable or not?

What are the three possible emissions when an atom decays?

Write or finish the following reactions:

alpha decay of ^{228}Ra

beta decay of ^{15}O .

The half-life of cobalt-60 is 10 minutes. If you start with a 100 g sample of cobalt-60 how much is left after one hour?

It takes 18 minutes for a 200 g sample of ^{218}Po to decay to 3.12 g. What is the half-life of ^{218}Po ?

Describe Neils Bohr's hydrogen atom in detail.

How do electrons behave when energy is added to the atom? How can the light that is given off be used to identify an element? For example, think of the flame test lab.

Define excited state and ground state.

Why was Bohr's model wrong?

What are Schrodinger and Heisenberg's contributions to the quantum model?

In the quantum model, what is an orbital? What kind of orbitals have we worked with? How many electrons do they hold and what are their shapes?

What are the principle and angular momentum quantum numbers?

Define Aufbau principle.

In the quantum model, can we precisely know the exact location of an electron?

What are the electrons in the outermost energy level called? _____

Which orbitals are these electrons found in? _____

What is the maximum number of these electrons an element can have? _____

Give the **electron configuration, noble gas notations, and electron dot notations** for the following elements/ions:

	<u>e⁻ configuration</u>	<u>noble gas notation</u>	<u>e⁻ dot</u>
Be			
O			
Zn			
Ca ²⁺			
O ²⁻			

Which elements have the following electron configurations?

1s ² 2s ¹	_____	1s ² 2s ² 2p ⁶ 3s ² 3p ⁵	_____
1s ² 2s ² 2p ⁴	_____	1s ² 2s ² 2p ⁶ 3s ² 3p ⁶ 3d ⁶ 4s ²	_____
[He] 2s ²	_____	[Kr] 4d ¹⁰ 5s ² 5p ³	_____

What types of elements combine to make an ionic bond? _____

Ionic Compounds

Use your ion sheet and the criss-cross method to give the formulas of the following ionic compounds.

Potassium iodide _____ Barium chloride _____ Lead (II) nitrate _____

Copper (II) carbonate _____ Magnesium phosphate _____ Iron (II) sulfide _____

Sodium acetate _____ Ammonium hydroxide _____ Tin (IV) sulfite _____

Name the following ionic compounds using your ion sheet

KClO₂ _____ Na₂SO₄ _____ Li₂CO₃ _____

CuCl _____ Pb(OH)₂ _____ Al₂O₃ _____

FeF₂ _____ Mg(NO₃)₂ _____ Ni(CN)₃ _____

Define the following terms:

Polyatomic ion

Covalent Bond

Ionic Bond

Crystal Lattice

Electrolyte

Non-electrolyte

Soluble

Insoluble

Isomer

Octet Rule

Explain the model of metallic bonding and how metallic bonds results in the properties metal have.

Explain how ions bond to form a crystal lattice. What properties does the lattice give to ionic compounds?

Classify the following substances as having ionic, metallic, or covalent bonds:

LiCl _____ A nonelectrolyte _____ SiO₂ _____

CHCl₃ _____ Platinum Metal _____ Ca(NO₃)₂ _____

Explain the kind of bonding taking place in Na₂SO₄

Draw the isomers of C₅H₁₂

What is electronegativity?

What happens to electronegativity from left to right across the periodic table? Explain why.

What is the trend in electronegativity in each group from top to bottom? Why?

How does electronegativity determine the types of bonds between atoms?

For the following compounds:

- A. Check off if the compounds contain ionic or covalent bonds.
- B. If the bonds are covalent, check off if they are polar or nonpolar.
- C. If the bonds are polar, indicate the direction of the dipole over two of the atoms.

	A		B		C
Compound	Ionic	Covalent	Nonpolar	Polar	Direction of Dipole
Ex: H ₂ O		✓		✓	O-H
LiCl					
OF ₂					
H ₂					

In 3D shapes of molecules, how do the electron domains arrange themselves?

Make a table listing the various molecule types and geometry types according to VSEPR theory.

Using drawings, explain why the AB₃ molecule is trigonal planar, but the AB₃E molecule is trigonal pyramidal.

Draw the Lewis structures for the following compounds, give their VSEPR geometry, and give their polarity.

Compound	Structure	Geometry	Polarity
NF ₃			
OI ₂			
CH ₄			
SiO ₂			

Explain how a molecule with polar bonds, can be non polar. Which molecule(s) above meet this criteria?

What are intermolecular forces?

Define the two types of intermolecular forces we talked about.

Explain how the intermolecular forces of water give it so many unique properties.

In the charged wand demonstration, explain why did the hexane not attract to the wand but the water did?